

DAFTAR PUSTAKA

- Anjarsari, I. R. D., Rosniawaty, S., & Suherman, C. (2015). Rekayasa Ekofisiologis Tanaman Teh Belum Menghasilkan Klon Gmb 7 Melalui Pemberian Asam Humat Dan Pupuk Hayati Konsorsium. *Jurnal Kultivasi*, 14(1), 25–31. <https://doi.org/10.24198/kultivasi.v14i1.12079>
- Ariyanti, M., Keliat, E. B., Suherman, C., Rosniawaty, S., & Soleh, M. A. (2022). Respons pertumbuhan biomassa bagian atas bibit kelapa sawit akibat pemberian kompos pelepah kelapa sawit, pupuk hayati, dan asam humat. *Jurnal Kultivasi*, 21(3), 1–11. <http://dx.doi.org/10.24198/kultivasi.v21i3.37975>
- Badan Pusat Statistik. (2025). Statistik Tanaman Perkebunan Tahunan Indonesia *Indonesia Permanent Estate Crops Statistics 2024. Statistic Indonesia Katalog: 5501008 ISSN 05100.25014 1, 2025*, 1–450
- Bakri, B., & Siagian, P. E. (2023). Analisis Persebaran Akar Tanaman Kelapa Sawit (*Elaeis guineensis* Jacq.) pada Jarak dan Kedalaman serta Unsur Hara NPK yang Berbeda. *Prosiding Seminar Nasional Lahan*, 6051(11), 172–184
- Boguta, P., & Sokolowska, Z. (2020). Zinc Binding to Fulvic acids : Assessing the Impact of pH, Metal Concentrations and Chemical Properties of Formed Soluble Complexes. *Molecules*, 25(6), 24. <https://doi.org/10.3390/molecules25061297>
- Dewanto, H. A., Ramadani, A., Nugroho, B., & Santosa, A. P. (2022). Respon Pertumbuhan Kultur Tunas Nodus Kentang (*Solanum tuberosum* L.) Pada Penambahan Berbagai Konsentrasi Asam Fulvat. *Jurnal Agritech*, 24(1), 116–120. <https://doi.org/10.30595/agritech.v24i1.13946>
- Khaled, H., & Fawy, H. A. (2011). Effect of Different Levels of Humic Acids on the Nutrient Content, Plant Growth, and Soil Properties under Conditions of Salinity. *Soil & Water*, 6(1), 21–29. <https://doi.org/10.17221/4/2010-swr>
- Lubis, R. E., & widarko, A. (2011). *Teknis Budidaya Kelapa Sawit di Areal Pasang Surut*. PT AgroMedia Pustaka
- Mansour, F.Y.O., & El-Metwaly H.M.B. (2019). Influence Of Addition Methods Of Fulvic Acid And Foliar Spray With Potassium Sources On Productivity And Quality Of Potato Crop. *Fayoum J. Agric. Res. & Dev.*, 33(1), 130–147
- Mindari, W., Sassongko, P. E., & Syekhfani. (2022). *Asam Humat Sebagai Amelioran Dan Pupuk Edisi 3*. UPN “Veteran” Jawa Timur
- Mubarok, A. D., Bariyyah, K., & Hadi, A. (2025). Pengaruh Fulvic Acid terhadap Pertumbuhan dan Daya Hasil Beberapa Hasil Varietas Semangka Exotic.. *Journal of Agricultural Sustainability (JOAS)*, 1(2), 51–58. <https://doi.org/10.62734/joas.v1i2.685>
- Musthofa, I., Wardana, I. N. G., & Widhiyanuriyawan, D. (2021). Peran Senyawa

- Asam Fulvat Dari Air Gambut Terhadap Produktivitas Gas Hidrogen Dengan Metode Elektrolisis. *Jurnal Rekayasa Mesin*, 12(3), 613–620. <https://doi.org/10.21776/ub.jrm.2021.012.03.11>
- Nikoogoftar-Sedghi, M., Rabiei, V., Razavi, F., Molaei, S., & Khadivi, A. (2024). Fulvic acid foliar application: a novel approach enhancing antioxidant capacity and nutritional quality of pistachio (*Pistacia vera* L.). *BMC Plant Biology*, 24(1), 241. <https://doi.org/10.1186/s12870-024-04974-0>
- Nora, S., & Mual, C. D. (2018). *Budidaya Tanaman Kelapa Sawit: Buku Ajar*. Pusat Pendidikan Pertanian
- Pamungkas, S. S. T., & Pamungkas, E. (2019). Pemanfaatan Limbah Kotoran Kambing Sebagai Tambahan Pupuk Organik Pada Pertumbuhan Bibit Kelapa Sawit (*Elaeis guineensis* Jacq.) Di Pre-Nursery. *Jurnal Mediagro*, 15(1), 66–76. <https://publikasiilmiah.unwahas.ac.id/index.php/mediagro/article/view/3071>
- Putra, T. K., Afany, M. R., & Widodo, R. A. (2020). Pengaruh Bahan Organik Dan Tanah Vertisol Sebagai Kalium Di Tanah Regosol Pasir Pantai. *Jurnal Tanah Dan Air (Soil and Water Journal)*, 17(1), 20–25. <https://doi.org/10.31315/jta.v17i1.4007>
- Saptiningsih, E., Kurnianto, I. Z., & Suedy, S. W. A. (2024). Pengaruh Aplikasi Kompos dan Asam Humat Terhadap Produktivitas Tanah Pasir dan Pertumbuhan Sawi Hijau (*Brassica juncea* L.). *Buletin Anatomi Dan Fisiologi*, 9(1), 102–110. <https://doi.org/10.14710/baf.9.1.2024.102-110>
- Savana, R. T., & Maharani, D. K. (2017). Pemanfaatan Asam Fulvat Sebagai Optimalizer dalam Pupuk Lepas Lambat Kitosan-Zeolit. *Sains & Matematika*, 5(2), 55–57. <https://journal.unesa.ac.id/index.php/sainsmatematika/article/view/6281>
- Sembiring, J. V., Nelvia, & Yulia, A. E. (2015). Pertumbuhan Bibit Kelapa Sawit (*Elaeis guineensis* Jacq.) Di Pembibitan Utama Pada Medium Sub Soil Ultisol Yang Diberi Asam Humat Dan Kompos Tandan Kosong Kelapa Sawit. *Jurnal Agroteknolgi*, 6(1), 25–32. <https://doi.org/10.24014/ja.v6i1.1373>
- Setiawati, M. R., Rachelita, N., Fitriatin, B. N., Nurbaity, A., Yuniarti, A., Suryatmana, P., & Hindersah, R. (2023). Pengaruh Pemberian Asam Humat, Asam Fulvat, dan Pupuk Hayati pada Media Tanam terhadap Beberapa Sifat Kimia Tanah, Hasil, dan Kualitas Buah Stroberi (*Fragaria ananassa*). *Jurnal Agrikultura*, 34(2), 255–263. <https://doi.org/10.24198/agrikultura.v34i2.46734>
- Silitonga, Y. R., Heryanto, R., Taufik, N., Indrayana, K., Nas, M., & Kusriani, N. (2020). *Budidaya Kelapa Sawit & Varietas Kelapa Sawit*. Balai Pengkajian Teknologi Pertanian Sulawesi Barat
- Soekarno, B. P. W., Surono, & Hendra. (2013). Optimalisasi Peran Kompos

Bioaktif Dengan Penambahan Asam Humat Dan Asam Fulvat Untuk Meningkatkan Ketahanan Tanaman Mentimun Terhadap Serangan *Pythium* sp. *Bionatura-Jurnal Ilmu-Ilmu Hayati Dan Fisik*, 15(1), 35–43.

Sulardi. (2022). *Budidaya Tanaman Kelapa Sawit: Buku Ajar*. PT Dewangga Energi Internasional.

Tan, K. H. (2014). *Humic Matter In Soil And The Environment: Principles and Controversies* (2nd ed.). CRC Press. <https://doi.org/10.1201/b17037>

Wahyuni, Maryani, A. T., & Fathia, N. M. E. (2014). Respons Pertumbuhan Bibit Kelapa Sawit (*Elaeis guineensis* Jacq.) Terhadap Pemberian Kombinasi Pupuk Kompos Kirinyuh (*Chromolaena odorata*) Dan Npkmg (15:15:6:4) Pada Berbagai Dosis Di Pembibitan Utama. *Jurnal Agroecotania*, 8(2), 96–103. <https://doi.org/10.22437/agroecotania.v8i2.50978>

Wandansari, N. R., Kurniawan, S., Suntari, R., & Soemarno. (2022). Improving Soil Fertility and Maize Growth in Suboptimal Land Through Application of Humic Acid. *International Journal of Design and Ecodynamics*, 17(5), 679–690. <https://doi.org/10.18280/ijdne.170505>

LAMPIRAN

Lampiran 1. Layout Penelitian

H0F0U1	H2F1U3	H1F3U1	H2F2U1	H1F0U2	H2F3U1
H2F2U2	H2F3U3	H0F2U3	H1F1U2	H3F0U3	H0F1U2
H1F1U3	H0F3U1	H1F2U1	H0F1U3	H3F2U2	H3F1U3
H3F1U2	H2F0U3	H0F0U2	H3F0U2	H1F3U3	H3F3U1
H0F2U2	H3F2U3	H2F1U1	H1F0U1	H2F0U1	H0F3U3
H3F0U1	H1F0U3	H2F3U2	H2F2U3	H0F0U3	H1F2U2
H3F3U2	H1F3U2	H3F1U1	H0F3U2	H2F1U2	H1F1U1
H1F2U3	H0F1U1	H2F0U2	H3F2U1	H3F3U3	H0F2U1

Keterangan:

- H0F0 = 0 g/l asam humat dan 0 g/l asam fulvat
 H0F1 = 0 g/l asam humat dan 5 g/l asam fulvat
 H0F2 = 0 g/l asam humat dan 10 g/l asam fulvat
 H0F3 = 0 g/l asam humat dan 15 g/l asam fulvat
 H1F0 = 3 g/l asam humat dan 0 g/l asam fulvat
 H1F1 = 3 g/l asam humat dan 5 g/l asam fulvat
 H1F2 = 3 g/l asam humat dan 10 g/l asam fulvat
 H1F3 = 3 g/l asam humat dan 15 g/l asam fulvat
 H2F0 = 5 g/l asam humat dan 0 g/l asam fulvat
 H2F1 = 5 g/l asam humat dan 5 g/l asam fulvat
 H2F2 = 5 g/l asam humat dan 10 g/l asam fulvat
 H2F3 = 5 g/l asam humat dan 15 g/l asam fulvat
 H3F0 = 7 g/l asam humat dan 0 g/l asam fulvat
 H3F1 = 7 g/l asam humat dan 5 g/l asam fulvat
 H3F2 = 7 g/l asam humat dan 10 g/l asam fulvat
 H3F3 = 7 g/l asam humat dan 15 g/l asam fulvat

Lampiran 2. Hasil Sidik Ragam Pertambahan Tinggi Tanaman (cm)

Tests of Between-Subjects Effects

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	128,003 ^a	15	8,534	,532	,903
Intercept	6156,270	1	6156,270	383,862	,000
Humat	63,622	3	21,207	1,322	,284
Fulfat	10,345	3	3,448	,215	,885
Humat * Fulfat	54,037	9	6,004	,374	,939
Error	513,207	32	16,038		
Total	6797,480	48			
Corrected Total	641,210	47			

Lampiran 3. Hasil Sidik Ragam Pertambahan Jumlah Daun (helai)

Tests of Between-Subjects Effects

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	6,000 ^a	15	,400	2,743	,008
Intercept	533,333	1	533,333	3657,143	,000
Humat	2,167	3	,722	4,952	,006
Fulfat	,667	3	,222	1,524	,227
Humat * Fulfat	3,167	9	,352	2,413	,032
Error	4,667	32	,146		
Total	544,000	48			
Corrected Total	10,667	47			

Lampiran 4. Hasil Uji Lanjut Pertambahan Jumlah Daun (helai)

Duncan^a

Interaksi	N	Subset for alpha = 0.05	
		1	2
H0F0	3	3,0000	
H0F1	3	3,0000	
H0F3	3	3,0000	
H1F2	3	3,0000	
H2F0	3	3,0000	
H2F1	3	3,0000	
H2F3	3	3,0000	
H3F3	3	3,0000	
H2F2	3	3,3333	3,3333
H0F2	3	3,6667	3,6667
H1F0	3	3,6667	3,6667
H1F1	3	3,6667	3,6667
H1F3	3	3,6667	3,6667
H3F0	3	3,6667	3,6667
H3F1	3	3,6667	3,6667
H3F2	3		4,0000
Sig.		,083	,073

Lampiran 5. Hasil Sidik Ragam Luas Daun (cm²)

Tests of Between-Subjects Effects

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	35135,485 ^a	15	2342,366	2,755	,008
Intercept	5286151,481	1	5286151,481	6218,016	,000
Humat	16728,425	3	5576,142	6,559	,001
Fulfat	2766,846	3	922,282	1,085	,370
Humat * Fulvat	15640,215	9	1737,802	2,044	,066
Error	27204,313	32	850,135		
Total	5348491,279	48			
Corrected Total	62339,798	47			

Lampiran 6. Hasil Uji Lanjut Luas Daun (cm²)

Duncan^{a,b}

Humat	N	Subset	
		1	2
H0	12	316,5583	
H1	12	316,9508	
H3	12	331,4358	
H2	12		362,4775
Sig.		,247	1,000

Lampiran 7. Hasil Sidik Ragam Pertambahan Diameter Batang (mm)

Tests of Between-Subjects Effects

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	140,666 ^a	15	9,378	2,042	,044
Intercept	4990,045	1	4990,045	1086,581	,000
Humat	54,011	3	18,004	3,920	,017
Fulfat	31,545	3	10,515	2,290	,097
Humat * Fulfat	55,110	9	6,123	1,333	,259
Error	146,958	32	4,592		
Total	5277,669	48			
Corrected Total	287,624	47			

Lampiran 8 Hasil Sidik Ragam Panjang Akar (cm)

Tests of Between-Subjects Effects

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	1767,563 ^a	15	117,838	,764	,705
Intercept	66335,070	1	66335,070	429,819	,000
Humat	712,095	3	237,365	1,538	,224
Fulfat	381,565	3	127,188	,824	,490
Humat * Fulvat	673,903	9	74,878	,485	,874
Error	4938,647	32	154,333		
Total	73041,280	48			
Corrected Total	6706,210	47			

Lampiran 9. Hasil Sidik Ragam Berat Segar Akar (g)

Tests of Between-Subjects Effects

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	461,570 ^a	15	30,771	1,257	,284
Intercept	3556,963	1	3556,963	145,248	,000
Humat	196,962	3	65,654	2,681	,063
Fulfat	69,058	3	23,019	,940	,433
Humat * Fulfat	195,550	9	21,728	,887	,547
Error	783,647	32	24,489		
Total	4802,180	48			
Corrected Total	1245,217	47			

Lampiran 10. Hasil Sidik Ragam Berat Kering Akar (g)

Tests of Between-Subjects Effects

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	17,546 ^a	15	1,170	1,295	,261
Intercept	160,199	1	160,199	177,309	,000
Humat	6,918	3	2,306	2,552	,073
Fulfat	5,490	3	1,830	2,025	,130
Humat * Fulfat	5,139	9	,571	,632	,761
Error	28,912	32	,904		
Total	206,657	48			
Corrected Total	46,458	47			

Lampiran 11. Hasil Sidik Ragam Berat Segar Tajuk (g)

Tests of Between-Subjects Effects

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	1128,766 ^a	15	75,251	1,058	,429
Intercept	12281,601	1	12281,601	172,615	,000
Humat	493,444	3	164,481	2,312	,095
Fulfat	226,491	3	75,497	1,061	,379
Humat * Fulfat	408,831	9	45,426	,638	,756
Error	2276,813	32	71,150		
Total	15687,180	48			
Corrected Total	3405,579	47			

Lampiran 12. Hasil Sidik Ragam Berat Kering Tajuk (g)

Tests of Between-Subjects Effects

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	63,723 ^a	15	4,248	,999	,480
Intercept	713,792	1	713,792	167,774	,000
Humat	24,968	3	8,323	1,956	,140
Fulfat	10,192	3	3,397	,799	,504
Humat * Fulfat	28,563	9	3,174	,746	,665
Error	136,144	32	4,254		
Total	913,658	48			
Corrected Total	199,866	47			

Lampiran 13. Hasil Sidik Ragam Berat Segar Tanaman (g)

Tests of Between-Subjects Effects

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	2891,893 ^a	15	192,793	1,134	,368
Intercept	29057,521	1	29057,521	170,937	,000
Humat	1247,329	3	415,776	2,446	,082
Fulfat	524,329	3	174,776	1,028	,393
Humat * Fulfat	1120,234	9	124,470	,732	,677
Error	5439,667	32	169,990		
Total	37389,080	48			
Corrected Total	8331,559	47			

Lampiran 14. Hasil Sidik Ragam Berat Kering Tanaman (g)

Tests of Between-Subjects Effects

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	140,960 ^a	15	9,397	1,086	,406
Intercept	1550,300	1	1550,300	179,108	,000
Humat	56,342	3	18,781	2,170	,111
Fulfat	29,297	3	9,766	1,128	,352
Humat * Fulfat	55,321	9	6,147	,710	,695
Error	276,982	32	8,656		
Total	1968,241	48			
Corrected Total	417,942	47			

Lampiran 15. Dokumentasi Penelitian



Asam Humat



Asam Fulvat



Pupuk NPK



Pengayakan



Media Tanam



Transplanting



Aplikasi Humat



Aplikasi Fulvat



Pupuk NPK 15-15-6-4



Penyiraman



Pembersihan Gulma



Aplikasi Pupuk NPK



Tinggi Tanaman



Diameter Batang



Jumlah Daun



Pemanenan



Luas Daun



Panjang Akar



Berat Segar Akar



Berat Segar Tajuk



Berat Kering



Berat Kering Akar



Berat Kering Tajuk



Berat Kering Tanaman



Pengovenan